

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Peter P. Altice, Jr. et al.

Application No.: 10/721,190

Confirmation No.: 6553

Filed: November 26, 2003

Art Unit: 2622

For: CMOS IMAGER WITH A CAPACITIVE
STORAGE NODE LINKED TO TRANSFER
GATE

Examiner: R. M. Bemben

REQUEST FOR RECONSIDERATION

MS AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the Office Action dated July 2, 2008, finally rejecting claims 3, 4, 6, 19-21, 23-29, 42, 43, 45, 46 and 48, Applicants respectfully request reconsideration of the above-identified U.S. patent application in light of the following remarks. Claims 3-4, 6, 19-29, 42, 43 and 45-48 are currently pending in this application.

Applicants note that upon allowance of claims 3 and 42, at least claims 5 and 7; and 44 which depend from claims 3 and 42, respectively, and any other claims which require all of the limitations of any allowed claim, should be rejoined and fully examined for patentability in accordance with 37 C.F.R. § 1.104. M.P.E.P. § 821.04(a).

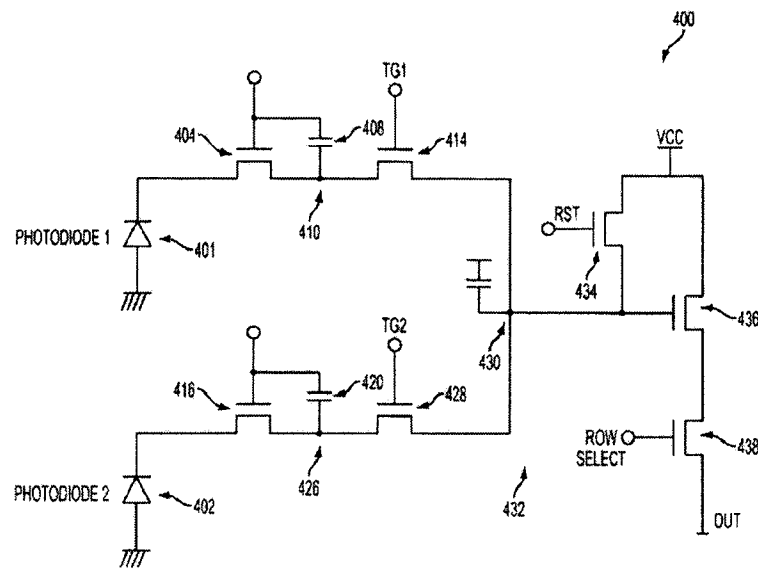
Claims 3, 6, 19, 20, 23-29, 42, 43, 45, 46 and 48 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kim et al. (U.S. Patent No. 6,731,335) ("Kim") in view of Beiley et al.

(U.S. Patent No. 6,522,357) (“Beiley”). This rejection is respectfully traversed and reconsideration is respectfully requested.

The Office Action characterizes claims 3 and 6 as “method claims corresponding to apparatus claims 19 and 20” and accordingly rejects claims 3 and 6 on the same basis as claims 19 and 20. Office Action, pg. 5. Accordingly, Applicants’ discussion focuses on the language of claim 19.

Claim 19 is drawn to a pixel circuit for use in an imaging device comprising “a plurality of photosensors ...; a plurality of transistors, each transistor connected to and transferring charge from a respective photosensor; a plurality of storage nodes, each node coupled to a respective shutter transistor and storing charge transferred by a respective one of said plurality of photosensors; a plurality of transfer gates, each transfer gate connected to and transferring charge from a respective storage node; a floating diffusion node connected to said plurality of transfer gates for receiving charge from said transfer gates; and a readout circuit connected to said floating diffusion node to output charge accumulated at the floating diffusion node.”

As can be seen in FIG. 3 (reproduced below for convenience), the claimed invention incorporates a storage node 410/426 located between the photodiode 401/402 and the floating diffusion (readout) node 430 (and in addition to the typical readout circuitry). A capacitor 408/420 is included that couples the storage node 410/426 to the global storage signal.



This arrangement is important to the claimed invention. Because the charge transferred from the photodiode is stored in the storage node, the floating diffusion region can be reset at the same time the image is captured. See, Specification, ¶¶[0031]. It also increases the capacity of the storage node. See, Specification, ¶¶[0051].

As admitted by the Office Action, Kim does not disclose a plurality of shutter transistors and storage nodes, the shutter transistors being connected to and transferring charge from a respective photosensor to a respective storage node. Office Action, pg. 5. The Office Action relies on Beiley to “teach an electronic shutter can be achieved in a CMOS image sensor by using a shutter transistor and a storage node.” Office Action, pg. 3.

However, Applicants respectfully disagree that Bailey discloses this feature. Applicants note that in Bailey the so-called “storage node” acts as a floating diffusion node and that the “pass transistor” would be more equivalent to the transfer transistor of the claimed invention. In other words, the “storage node” of Bailey is not in addition to the readout circuitry, but is a part of it. This is further supported by the fact that one of the purposes of the invention in Bailey is to allow CMOS image sensors to support frame mode operation and large pixel formats. Bailey does not

have a storage node between the photodiode and the readout node; Bailey merely has a photodiode and a readout node, acting to store charge. See, Bailey, col. 3, lines 22-27. Bailey does not disclose adding an additional shutter transistor and storage node to an already complete pixel circuitry.

Accordingly, Applicants respectfully submit that claim 19 is not obvious in view of the cited combination. Claims 3, 27 and 42 contain limitations similar to those of claim 19 and are allowable over the cited combination for at least the reasons mentioned above with respect to claim 19 and on their own merits. Claim 6 depends from claim 3 and is allowable along with claim 3. Claims 20 and 23-26 depend from claim 19 and are allowable along with claim 19. Claims 28 and 29 depend from claim 27 and are allowable along with claims 27. Claims 43, 45, 46 and 48 depend from claim 42 and are allowable along with claim 42. Applicants respectfully request that the rejection of claims 3, 6, 19, 20, 23-29, 42, 43, 45, 46 and 48 be withdrawn and the claims allowed.

Claims 4 and 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kim in view of Bailey and further in view of Merrill (U.S. Patent No. 6,697,114) (“Merrill”). This rejection is respectfully traversed and reconsideration is respectfully requested.

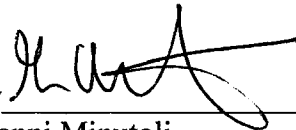
Claims 4 and 21 depend from claims 3 and 19, respectively, which are allowable over Kim in view of Bailey for at least the reasons discussed above. Merrill is relied upon as disclosing that the storage capacitors are formed above the substrate (Office Action, page 10), and does not remedy the deficiencies of the Kim/Bailey combination as to claims 3 and 19. Accordingly, claims 3 and 19, along with claims 4 and 21, are allowable over the cited combination. Applicants respectfully request that the rejection of claims 4 and 21 be withdrawn and the claims allowed.

Applicants gratefully acknowledge the Examiner’s statement that claims 22 and 47 would be allowable if rewritten in independent form. However, in view of the arguments advanced above, Applicants believe the claims to be allowable in their current dependent form. Applicants respectfully request that the objection be withdrawn and the claims allowed.

In view of the above, Applicants believe the pending application is in condition for allowance.

Dated: November 3, 2008

Respectfully submitted,

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